AN ANALYSIS OF THE FINANCE GROWTH NEXUS IN NIGERIA

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Abstract

This study empirically examines the relationship between financial development and economic growth in Nigeria. It employs statistical techniques such as the Autoregressive Distributed Lag approach as well as a short and long run Granger Causality test on time series data spanning from 1960-2016. Empirical results reveal that the financial development indicators have a long run relationship with economic growth in Nigeria and the existence of unidirectional and bidirectional Granger causality was also discovered. This study recommends that policy should be geared towards promoting financial development in the country as well as encouraging more financial depth and openness – in order to foster economic growth in Nigeria.

Keywords: finance growth nexus, financial development, economic growth, Autoregressive Distributed Lag approach, Granger Causality

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CHAPTER 1: INTRODUCTION

The initial debate surrounding the finance growth nexus began with the seminal research of Bagehot (1873). Bagehot discovered a link between the financial sector and growth in the real economy. Our understanding of how and when a growing financial industry translates into better growth prospects for a country is very limited (Wachtel 2011). A more complete understanding of the finance growth nexus can have major welfare implications as it would serve to provide the backbone for a policy framework in economic growth and development. Given the prevalence of poverty in such a vast number of countries around the world, the importance of this theory should not be overlooked (Marwa, Zhanje 2015). The key issue surrounding this debate revolves around whether economic growth in the real sector occurs due to growth in the financial sector through the process of economic development or, whether development in the real sector drives financial sector development. In many previous studies, banking sector development has served as a proxy for a country's financial development (Louw 2015).

Despite the existence of previous research conducted on the subject of the finance growth nexus, there is still no clear consensus on the exact nature of the relationship between financial development and economic growth. Studying the relationship between financial development and economic growth is critical for Nigeria, considering that it is a country whose financial industry has undergone many transformations in a relatively short span of time. As well as the fact that the country is facing significant developmental challenges, such as reducing its dependence on the oil production industry and diversifying the economy. A significant portion of Nigeria's population still live in poverty and could benefit from more inclusive development policies (The World Bank 2017). Most of the reviewed studies (on Nigeria's economy) have some methodological and conceptual problems that undermine their accuracy and efficacy for effective policy purpose (Nkoro, Uko 2013). There has not been an expanse of empirical research conducted using Nigerian data or employing statistical techniques that are suited to the data that is available. This study aims to contribute to the existing literature around the finance growth nexus in Nigeria, with the goal of suggesting appropriate development policy.

Previous studies on the finance growth nexus in Nigeria suffer from a number of key limitations, that serve to diminish the validity of their findings. One such limitation is the use of cross-sectional, financial data. The issue with the use of cross-sectional data is that when cross-country analysis is performed, countries which are in different stages of their financial and economic development are compared – which can skew results. It is also only able to provide pooled estimates of causal relationship between financial sophistication and economic growth. Another limitation is the cointegration approaches employed by a majority of previous studies. These studies make use of statistical tests such as the Engle and Granger residual-based cointegration test as well as the maximum likelihood estimation cointegration technique developed by Johansen. These tests have recently been deemed as inappropriate for studies employing small sample sizes, which is the case for a majority of African countries. Furthermore, these techniques require that the variables used in the model must all be integrated of the same order, which can serve to limit the scope of empirical research (Louw 2015). This study attempts to overcome the limitations discussed above by making use of the Autoregressive Distributed Lag approach to cointegration, an approach suitable for examining smaller sample sizes of data as well as including a wide array of variables to proxy financial sector sophistication, which are integrated of different orders; and utilising a broader span of time-series data (1960 – 2016) on key financial indicators of Nigeria's economy.

This paper empirically examines the relationship between financial development and economic growth, in Nigeria. The layout of the paper is as follows: A literature review is conducted in Section 2, focusing on both theoretical and empirical research. Section 3 describes the variables included in the model and their relevance, as well as specifying the model used. A brief overview of the Nigerian economy and financial system is also included in Section 3. Section 4 presents empirical findings from the statistical tests run. Section 5 concludes the paper and presents fundamental findings and policy recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 THEORETICAL OVERVIEW

The initial theoretical considerations around the finance growth nexus can be traced back to the work of Bagehot in the 1870s – who first introduced the idea of the importance of the financial system on economic growth. Bagehot's theory showed the link between the real economy and the financial sphere. He predicted that capital would flow to the sectors where it would be best utilised (Bagehot 1873). This prediction complements standard neoclassical theory of supply and demand. There are however several assumptions that must hold in order for this theory to be valid. These include: perfect information, a frictionless economy, and mobile resources – some of these assumptions do not always hold in the real world. This could explain why the neoclassical theory of perfect markets fails to hold, which in turn leads to market imperfection and frictions. Despite some criticisms, the main ideas of Bagehot's theory which emphasized the role of the financial system in pooling resources with the goal of allocating them to the optimal (most profitable) channels, still hold to this day. Bagehot concluded that the financial system plays a role in cultivating economic growth.

Bagehot's work attracted the interest of many scholars and led to a voluminous amount of theoretical and empirical work on the subject. The school of thought piloted by Schumpeter and Keynes was favoured in the first half of the twentieth century. Schumpeter believed financial development to be the catalyst of economic growth. The Schumpeterian view states that growth is driven by innovation, and innovation is driven by credit. According to Schumpeter, innovation could come in the form of new means of production, new ways of producing goods, new market development or innovation in raw material and sectorial alteration (Marwa, Zhanje 2015). There are two ways to make the new combinations work: by means of administrative power and by means of bank loans (in the case of a market economy). Schumpeter viewed banks and other financial institutions as an intermediary between innovators and the owners of capital. Thus, once the bank issues loans, it facilitates the implementation of innovative ideas, which have the effect of spurring economic growth. Based on this school of thought, it can be argued that finance fosters economic development during the early stages of growth (Arestis and Demetriades 1995).

Schumpeter's idea of the positive role of financial institutions in promoting economic growth wasn't widely accepted because his publication "*The Theory of Economic Development*" was

published at the dawn of the first World War, a period during which the USA and leading European countries were undergoing a severe recession. Under such conditions the financial determinant of economic growth was unlikely to receive due attention, as The Great Depression began because of a stock market collapse and the paralysis of the banking sector. During this time, processes in the real economy were the priority and the development of the financial sector took a back seat. These views explain the absence of outstanding research dedicated to the finance growth nexus in the 1930s-1940s. The popularization of the neoclassical synthesis characterized this period. The common wisdom was that financial development was a by-product of economic growth rather than a driving force behind it (Stolbov 2012).

The second half of the twentieth century attracted more research into the finance growth nexus. Gurley and Shaw (1955) outlined the weaknesses of the Keynesian school of thought and highlighted how inefficient his theoretical framework is when subjected to modelling both real and financial economies. This debate was compounded by Gerschenkron's concept of economic backwardness. According to Gerschenkron, the level at which finance impacts economic growth depends on the degree of economic backwardness of the country. Countries that aren't as economically developed (or backward) need a stronger financial system to foster development, while those countries that are more economically developed do not need an active financial sector (Marwa, Zhanje 2015).

Patrick (1966) expanded on Gerschenkron's sentiment on the difference in relationship between financial development and economic growth, for developed and developing countries in the paper "*Financial Development and Economic Growth in Underdeveloped Countries"*. He argued that in the early stage of a country's economic development, the financial system catalyses economic growth (the supply-leading hypothesis). Whereas, as the country advances toward becoming a more developed nation, this growth organically creates a demand for the financial sector to be developed (the demand-following hypothesis). Thus, in the case of more developed countries, there will exist a weaker relationship between financial development and economic growth as opposed to developing countries (Patrick 1966).

Several authors including: King and Levine (1973); Thiel (2001) and Lee (2005) present a theoretical landscape which aims to explain the linkage between finance and economic

growth. It can be categorized into three key approaches: microeconomic foundation, macroeconomic foundation and an empirical approach.

The microeconomic foundation criticizes the premise of perfect markets in the economy. It demonstrates the need for the inclusion of information asymmetry, transaction costs and other sources of friction into models attempting to derive the impact of financial strength on economic growth. The microeconomic foundation presents the idea of an optimal financial contract, which can only be achieved by addressing the challenges arising from information asymmetry such as: moral hazard and adverse selection. Financial systems can utilise certain measures to mitigate these challenges, such as utilising more well-designed screening processes to identify credit-worthy borrowers from non-creditworthy ones. This will facilitate an optimal allocation of resources to enterprises that are more likely to succeed. The screening mechanism is aided by a process of monitoring – which can often be expensive and may lead to credit rationing. If credit rationing becomes prevalent, it lowers savings which has the effect of inhibiting economic growth, due to the subsequent transformation of saving into investment (Marwa, Zhanje 2015).

The macroeconomic foundation approach utilises the endogenous growth model of Romer and Lucas to aid in the explanation of the relationship between finance and economic growth. According to this school of thought, finance impacts economic growth across different channels through the process of capital accumulation. Accrued capital can be invested to fund the innovation process and improve technological progress – which will catalyse economic growth. This is a similar line of thinking to the one adopted by Schumpeter. Financial institutions are believed to reduce transaction costs through the process of mitigating information asymmetry and pooling resources. The savings derived from reduced transaction costs and increased efficiency can be used to foster economic growth. The influence of financial markets on savings is inconclusive in this model, as it depends on the utility functions and indifference curves of individual economic agents. Thus, an enhanced financial market may lead to either an increase or decrease in savings (Baltagi, Demetriades et al. 2007).

A series of empirical studies have been conducted to further understand the causal relationship between finance and growth. There is a consensus that there does exist a causal relationship between the variables. It is still unclear from both theoretical and empirical standpoints about a dominant view in which direction the causality flows. It is believed that

finance plays an important role during the initial stage of development of a country's growth. It should also be noted that the relationship between finance and growth is nonlinear, implying finance enhances economic growth up to a certain turning point, where it starts to become self-destructive (Marwa, Zhanje 2015)

1.2 **EMPIRICAL OVERVIEW**

Empirical studies surrounding the finance growth nexus either employ formal growth models, or simply consider the existence of causal relationships. An example of some empirical studies that have been conducted is the work of Arestis and Demetriades (1997). They evaluate the extent to which financial systems contribute to economic growth in the paper: "*Financial Development and Economic Growth: Assessing the Evidence".*
This study makes use of stock market development and volatility indicators to shed more light on the relationship between economic growth and financial development. The impetus for the inclusion of these stock market variables stems from research conducted by Levine (2003) – which postulates that stock market development could be used to explain future economic growth. Stock markets generate speculative pressures which are induced by financial liberalization, a process that rewards short-term speculators and punishes those with long-term views. An undesired implication of speculative pressure is that economies are forced to bear more ambient risk which may have the effect of reducing the volume of real-sector investment while exerting upward-pressure on interest rates due to a greater risk factor.

Arestis and Demetriades (1997) provide an analysis of financial development and growth in Germany and the United States. Four variables are utilized for each country, namely: logarithms of real GDP per capita, the stock market capitalization ratio (ratio of stock market value to GDP), and an index of stock market volatility. The fourth variable for Germany is the logarithm of the ratio of M2 to nominal GDP and for the United States the fourth variable is the logarithm of the ratio of domestic bank credit to nominal GDP (these variables are used as proxies for the development of the banking sector in both countries). Results show that in the case of Germany, there exists a positive relationship between real GDP per capita and banking system development. It also suggests that stock market volatility is negatively related to real GDP. Results also point to a lack of any long-run effect of real GDP on banking sector development. In the case of the United States stock market capitalization appears to be

endogenous to the system while being positively related to real GDP and negatively related to banking sector development. A positive relationship between banking system development and real GDP was also reported. Stock market volatility was positively related to banking sector development and negatively related to real GDP – reflecting the inverse relationship between banking systems and capital markets. The authors concluded that based on their results, there is insufficient evidence to suggest that financial development causes growth in real GDP, in the case of the United States. There were however signs of reverse causality, in that real GDP contributed positively to both banking system and capital market development variables (Arestis and Demetriades, 1997).

Another empirical study by Levine (2003) focuses on three empirical studies to uncover the relationship between financial development and economic growth.
Broad cross-country growth regressions are employed, to study finance and growth. The studies aggregate economic growth over long periods of time and assess the relationship between long-run growth and measures of financial development. A variable, "DEPTH", is constructed - which is equivalent to the size of the financial intermediary sector. It is calculated by dividing the liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries) by GDP. Levine (2003) notes that this variable is indicative of the size of the financial intermediary sector but does not accurately proxy how effectively the financial system operates. The author experiments with alternative measures of financial development and generates similar results. The strength of the empirical relationship between "DEPTH" and three growth indicators (average rate of real per capita GDP growth, average rate of growth in capital stock per person and total productivity growth) is examined. The results of the analysis indicate a statistically significant and economically large relationship between "DEPTH" and the growth indicators. Results suggest that if "DEPTH" were to be increased from the mean of the slowest growing quartile of countries (0.2) to the mean of the fastest growing quartile of countries (0.6) – the per capita growth rate would increase by 1 percent per year. The study also accounts for whether the value of financial depth in 1960 (the period from which the data was gathered) could predict the rate of economic growth, capital accumulation and productivity growth over the next 30 years. After controlling for variables such as: income, education and measures of monetary trade and fiscal policy – Levine (2003) concludes that financial depth in 1960 is a suitable predictor of subsequent rates of economic growth and that financial development can predict long-run growth.

Levine (2003) moves on to study the impact of stock markets and banks on economic growth. The liquidity indicator "turnover ratio" is constructed to proxy stock market development. It is calculated by dividing the total number of shares traded on a country's stock exchange by stock market capitalization (value of listed shares on the country's exchange). Results show that the initial level of stock market liquidity and initial level of banking development are positively and significantly correlated with future rates of economic growth, capital accumulation and productivity growth. These results are consistent with models that predict stock market liquidity catalyzes long-run growth. Results also point to the importance and distinction between the financial functions provided by banks and stock markets. In empirical terms the results obtained predict that if a country were to increase both stock market liquidity and bank development by one standard deviation, then by the end of the 18-year period, real per capita GDP would increase by almost 30 percent and productivity would improve by almost 25 percent. The author also notes that simply listing on the national stock exchange does not necessarily foster growth but, rather the ability to trade ownership of the economy's productive technologies influences resource allocation and economic growth.

Levine (2003) also employs an instrumental variable, measures of legal origin, to assess whether the finance-growth relationship is driven by simultaneity bias. This variable explains cross-country differences in financial development but is otherwise uncorrelated with economic growth. Results show that a country's legal origin, whether the country's commercial/company law derives from British, French, German or Scandinavian law, can shape the national approach to laws concerning creditors and the efficiency with which those laws are enforced. Financial development can be promoted through laws that protect and effectively enforce the rights of external investors, since the financial system is essentially based on contracts. The legal origin indicators are used as instrumental variables for measures of financial development and are treated as exogenous variables. The author also develops a new measure of overall financial development, private credit. This is equal to the value of credits by financial intermediaries to the private sector, divided by GDP. Results find a strong connection between the exogenous component of financial intermediary development and long-run economic growth, as well as a positive link to both capital accumulation and productivity growth – suggesting an economically large positive association between financial development and growth (Levine, 2003).

Nkoro and Uko (2013) examined the effect of financial development on economic growth in Nigeria, using an error correction model, and a sample of data spanning from 1980 to 2009.

Their findings showed that the financial development indicators: stock market capitalization, interest rate and broad money stock all served to stimulate economic growth. These results are not necessarily accurate however, as the authors' research suffers from a few limitations. Nkoro and Uko (2013) employ a small sample size of data. It covers the period of 1980 to 2009 however, the adjusted sample size only utilizes data from the year 1984 to 2009, 26 observations in total. This limitation in sample size is further exacerbated by the authors' use of the Johansen cointegration test. This test of cointegration between variables is not suitable for small sample sizes of data (such as the sample used by the authors) – and it serves to diminish the accuracy of results generated by the statistical tests run.

Odeniran and Udeaja (2010) empirically examine the finance growth nexus in Nigeria with the use of a Vector Autoregressive (VAR) framework. The authors find that credit to the private sector, financial deepening and deposit liability all Granger cause output. Additionally, a bidirectional relationship between GDP per capita and credit to the private sector was also discovered. These results of Granger causality, using the VAR framework, are only short run estimations of the relationships between these variables – long run relationships between the financial development indicators and economic growth were not examined in this study. When cointegration is present between variables, a more appropriate approach is the Vector Error Correction (VEC) framework, in order to generate more accurate results.

Agbetsiafa (2004) investigates the relationship between financial development and economic growth in several Sub-Saharan, African countries using data spanning over the period 1963-2001. The author's proxies for financial development include: the ratio of money to income, the ratio of bank deposit liabilities to income, the ratio of private sector credit to income, the ratio of private sector credit to domestic credit, and the ratio of domestic credit to income. The results of the error correction model indicate a unidirectional causality running from financial development to economic growth, in the case of Nigeria. The use of these unconventional explanatory variables may serve to deteriorate the accuracy of results gathered from this study, the variables employed by Agbetsiafa (2004) are not the most accurate proxies for financial development. The author's use of the Johansen cointegration test, further limits the scope of the explanatory variables included in the model.

In the paper "*Financial development and economic growth in Nigeria: Evidence from threshold modelling",* the authors examine the effect of non-linearities in finance growth, by

introducing thresholds into their empirical analysis. The impetus for this, according to the authors, being that the influence of financial development on growth may only become apparent once a given level of financial development is achieved by an economy. The authors made use of an ARDL model using data from 1960 – 2010 and the results showed that financial development negatively impacted economic growth however, once threshold-type effects were taken into account, a sign reversal resulted, indicating a turning point in the finance growth relationship. The implication of this being that initially financial development mattered little for economic growth but, upon a certain level of financial development being surpassed, some positive growth influence becomes apparent (Adeniyi, Oyinlola et al. 2015).

Chukwu and Agu (2009) implemented a multivariate VECM model to investigate the relationship between financial depth and economic growth in Nigeria from 1971 to 2008. The findings from their study indicated that financial depth and economic growth share a stable long-relationship with a unidirectional causality running from economic growth to financial depth (proxied by private sector credit and broad money supply) supporting a demand - following hypothesis. While a supply-leading hypothesis was discovered for loan deposit ratio and bank deposit liabilities, with causality flowing in the opposite direction. The results implied that the indicator used for financial depth had a great influence on the causal inference (Chuwkwu, Agu 2009).

Contrary to this, in the paper "*Financial Deepening and Economic Growth Nexus in Nigeria: Supply-Leading or Demand-Following?"* Karimo and Ogbonna (2017) find that all financial deepening variables in their model jointly have a causal effect on economic growth, but not always individually. The results supported the view that the supply-leading hypothesis prevailed in Nigeria with the significant contribution of this study being that financial services may affect economic growth through a multitude of channels, some of which may depend on the size of the financial institution or the level of activity in these institutions (Karimo, Ogbonna 2017).

The following section will discuss the data and methodology used in this study, as well as providing a brief overview of the Nigerian economy and financial sector.

CHAPTER 3: DATA and METHODOLOGY

3.1 OVERVIEW OF THE NIGERIAN ECONOMY

With a population of roughly 184 million people, Nigeria makes up 47% of the West African population and has one of the largest population of youths in the world. Nigeria is a political federation consisting of 36 autonomous states and a society comprising of a diverse array of cultures and ethnicities. Nigeria is the largest exporter of oil in Africa and is home to the largest natural gas reserve on the continent, it also boasts an abundance of natural resources.

Nigeria is a middle-income, mixed economy emerging market with rapidly expanding manufacturing, financial services, communications, technology, and entertainment sectors. It is currently ranked as the 21st largest economy in the world, based on nominal GDP figures and the 20th largest in terms of purchasing power parity. Nigeria is the fastest growing economy in Africa, its manufacturing sector became the largest in the continent in 2013. According to many financial speculators, Nigeria is predicted to achieve the highest average GDP growth in the world between 2010 and 2050 (Trading Economics 2018).

Nigeria's economy grew by 2.7% in 2015, a significant decline from its 2014 growth figure 6.3%. This was largely due to the fall in oil prices during mid-2014, which resulted in Nigeria's growth going into a downward spiral. The substantial volatility in Nigeria's growth has imposed significant welfare costs on Nigerian households. The economy slipped into a recession after recording two consecutive quarters of negative growth in 2016. In the third quarter of 2016 GDP continued to exhibit negative growth which was exacerbated by the significant decline in the country's oil output, shortages of power and fuel, and a reduction in foreign exchange. Inflation doubled to 18.8% at the end of 2016, this was chiefly due to the increase in electricity and fuel price as well as the depreciation of the Nigerian Naira. After declining for five consecutive quarters, in the second quarter of 2017, the Nigerian economy returned to growth. GDP grew by 0.6% during the second quarter of 2017, largely due to the recovery of oil production in the country and the growth in the agricultural industry. Growth reached 9.5% in the third quarter of 2018, marking a significant recovery of the Nigerian economy. Economic growth is expected to remain steady because of the improved availability of foreign exchange, to support imports, as well as the continued recovery of oil production. Average inflation is expected to remain at this relatively high level of 14%. In the first quarter of 2018, Nigeria recorded an unemployment rate of 18.8%. The predicted high

rate of inflation persisted into the third quarter of 2018, with a figure of 23.1% recorded (Trading Economics 2018).

Restoring macro-economic growth remains a primary agenda of the Nigerian government however, there exist developmental challenges that hinder this process. Some of the challenges faced by Nigeria include: an under-utilisation of the private sector, largely due to a poor regulatory environment and lack of access to financial resources. There is a need to promote job creation in the country and foster inclusive growth. Income inequality has been growing persistently and has had an adverse impact on poverty reduction. Other social welfare challenges include: the vast disparity in access to health services, education and water as well as improving the efficiency and quality of social service delivery (The World Bank 2017).

The Nigerian financial system consists of the formal sector (banks and other financial institutions) and the informal sector (savings and loan associations and local money lenders). The institutions are regulated by the Central Bank of Nigeria, Federal Ministry of Finance, Nigeria Deposit Insurance Corporation, Securities and Commission and the Federal Mortgage Bank of Nigeria.

A significant amount of emphasis is placed on driving growth in Nigeria's economy. The financial sector was highly regulated in the seventies, due to the government holding a controlling share in many of the country's banks. The liberalization of the banking industry in the mid-eighties, served to drive growth in the industry (Odeniran, Udeaja 2010).

There are currently 27 banks operating in Nigeria, a figure that has remained consistent after a period of consolidation in 2004 that reduced the number of financial institutions operating in the country from 89 to 27. Of these institutions, 22 are commercial banks, there are 4 merchant banks and 1 non-interest bank. The procurement of government securities is a key source of revenue growth in the financial sector (Oxford Business Group 2018).

3.2 **DATA**

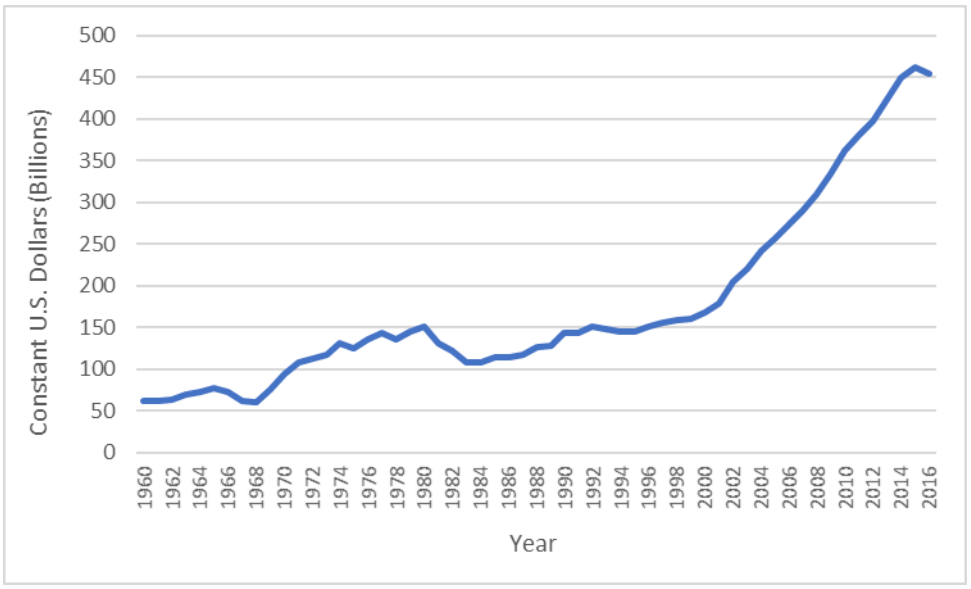
To gauge the effect of financial development on growth of Nigeria's economy, a series of statistical analysis will be conducted using data from the World Bank Development Indicators as well as the Federal Reserve Bank of St. Louis. The data are time series covering the period 1960-2016. The choice of variables was based on a theoretical connection between financial development and economic growth as well as previous literature on the subject. This section compiles a list of dependent and independent variables that are included in the regression analysis and the justification as to why they are important in the context of the model. A summary statistics table of all the variables included in the empirical model is included below:

Table 1: Summary Statistics Table of Empirical Model Variables, 1960 -2016

Variable	Description	Mean	Standard Deviation	Minimum Value	Maximum Value
GDP	GDP represents the natural log of real GDP in constant form.	**$176,295,849,833**	**1,09**	**$60,987,434,624**	**$461,850,352,959**
DEPTH	DEPTH represents the ratio of the natural log of broad money to GDP.	**20,5**	**7,73**	**9,21**	**43,27**
CREDIT	CREDIT represents the ratio of the natural log of private sector credit to GDP.	**11,87**	**6,42**	**3,7**	**38,35**
LIQUID	LIQUID represents the ratio of the natural log of liquid liabilities to GDP.	**16,77**	**6,5**	**9,32**	**33,86**
STOCK	STOCK represents the ratio of the natural log of the total value of shares traded to GDP.	**1,43**	**1,98**	**0,02**	**8,65**
CAP	CAP represents the ratio of the natural log of stock market capitalisation to GDP.	**15,47**	**9,82**	**3,84**	**35,84**

Source: (The World Bank 2017), (Federal Reserve Bank of St. Louis 2017)

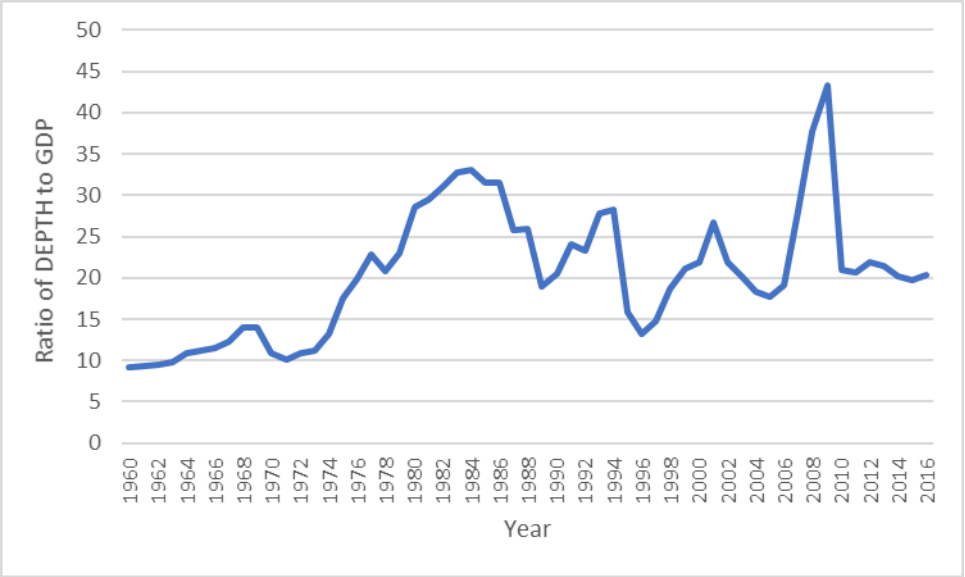
Figure 1: Real GDP in Nigeria, 1960-2016



Source: (The World Bank 2017)

The variable GDP represents the natural log of real GDP in constant form. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2011 U.S. dollars. This variable is used as a proxy for economic growth. The trend data above shows a gradual increase of Nigeria's GDP over time, with a steep incline from 2002 onwards.

Figure 2: DEPTH – The Ratio of Broad Money to GDP in Nigeria, 1960-2016

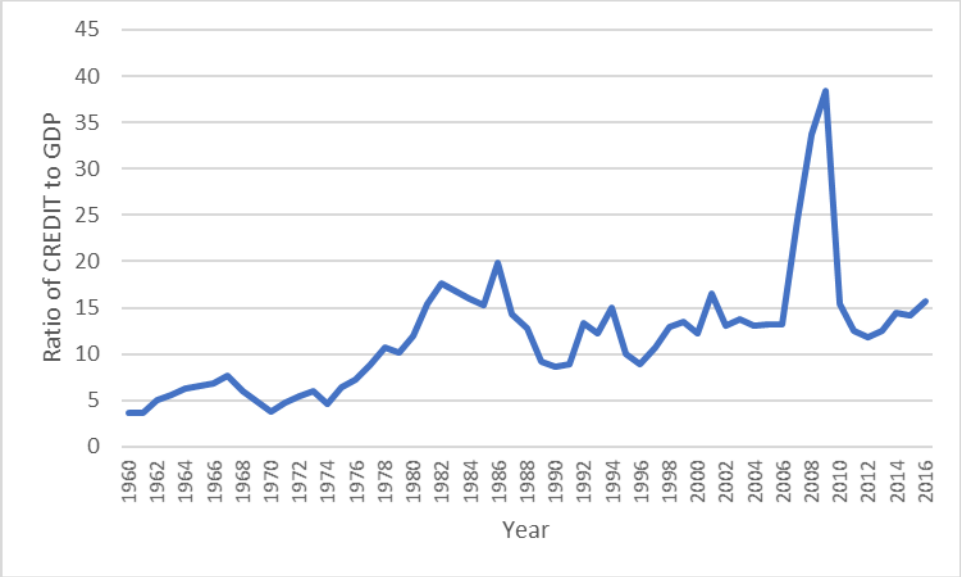


Source: (The World Bank 2017)

DEPTH represents the ratio of the natural log of broad money to GDP. Broad money or M2 is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveller's checks; and other securities such as certificates of deposit and commercial paper. This variable is used as a measure of financial depth, reflecting the size of the financial sector.

The ratio of broad money to GDP also exhibits an upward trend over time, with a downward spike during 1996 and a peak during 2010.

Figure 3: CREDIT – The Ratio of Private Sector Credit to GDP in Nigeria, 1960-2016

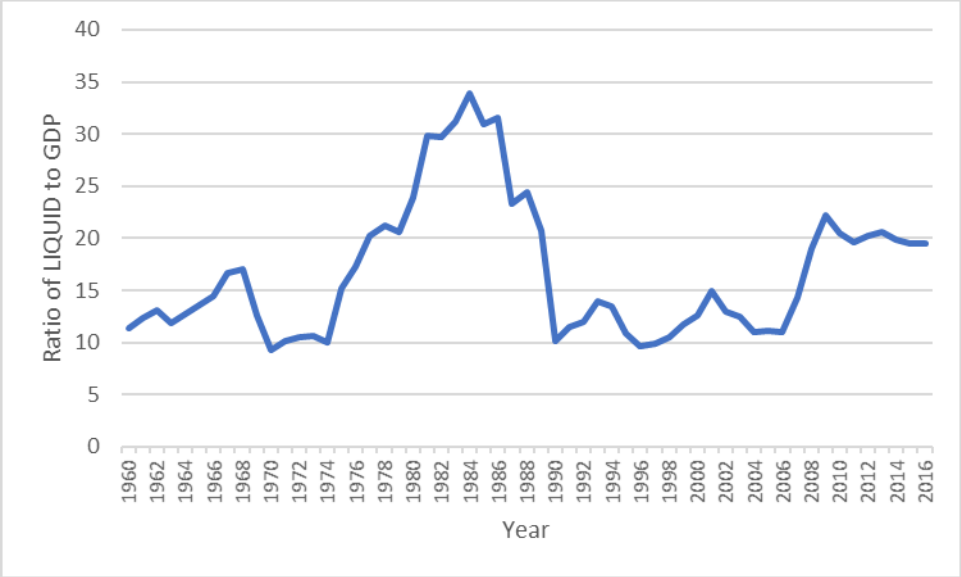


Source: (The World Bank 2017)

CREDIT represents the ratio of the natural log of private sector credit to GDP. Private sector credit refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). It offers an assessment regarding the allocation of financial assets within the market (Louw 2015).

The data shows a steady upward trend in the data, over time, with a downward spike during 1990 and a peak during 2010.

Figure 4: LIQUID – The Ratio of Liquid Liabilities to GDP in Nigeria, 1960-2016

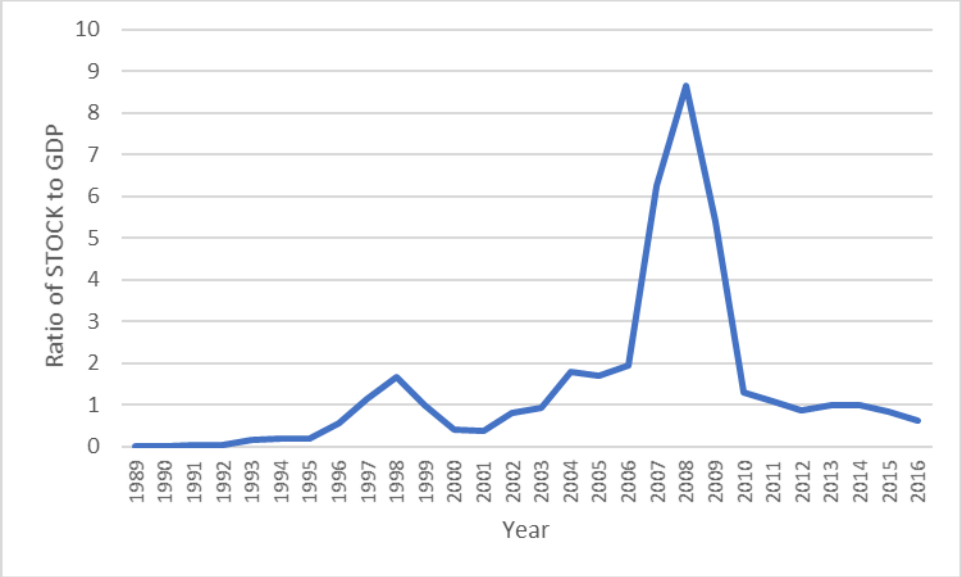


Source: (Federal Reserve Bank of St. Louis 2017)

LIQUID represents the ratio of the natural log of liquid liabilities to GDP. Liquid liabilities are also known as broad money, or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travellers' cheques, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.

The data exhibits an upward trend with a trough during 1970 and a peak during 1984.

Figure 5: STOCK – The Ratio of The Total Value of Shares Traded to GDP in Nigeria, 1989-2016

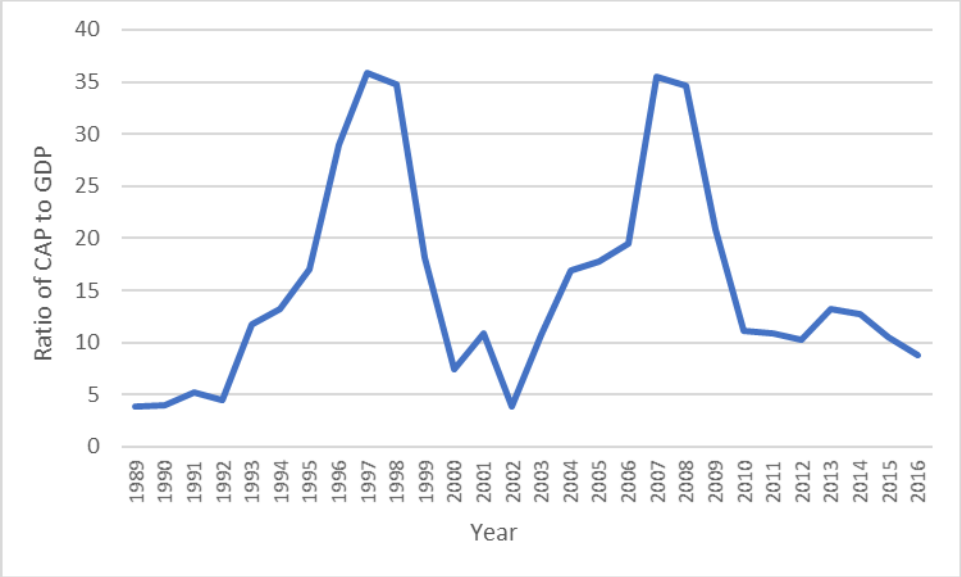


Source: (Federal Reserve Bank of St. Louis 2017)

STOCK represents the ratio of the natural log of the total value of shares traded to GDP. The value of shares traded is the total number of shares traded, both domestic and foreign, multiplied by their respective matching prices. Figures are single counted (only one side of the transaction is considered). Companies admitted to listing and admitted to trading are included in the data. Data are end of year values. It serves as a measure of stock market liquidity (Louw 2015).

The data shows strong evidence of an upward trend, peaking during 2009.

Figure 6: CAP – The Ratio of Stock Market Capitalisation to GDP in Nigeria, 1989-2016



Source: (Federal Reserve Bank of St. Louis 2017)

CAP represents the ratio of the natural log of stock market capitalisation to GDP. The stock market capitalisation ratio represents the total value of shares listed on a country's exchange, divided by real GDP. It is representative of whether a stock market is growing, which could likely be as a result of increased stock market development. A larger stock market could provide increased investment incentive and consequently higher growth (Louw 2015).

The data shows evidence of an upward trend, with a downward spike during 2002 and a peak during 2007.

3.3 EMPIRICAL METHODOLOGY

3.3.1 UNIT ROOT TEST

In order to test for the stationarity of the variables a unit root test was applied to each input variable. Unit root tests are necessary to identify any possible series of data that are integrated of order two. Variables that are found to be integrated of order two will be omitted from the estimation model, as they undermine the validity of the results and are unable to be included in the ARDL approach test. The Augmented Dickey-Fuller (ADF) unit root test was selected for this study. The ADF test uses a parametric approach to test for stationarity in a series, using Monte Carlo simulations (Louw 2015). The results of the unit root tests can be found in the appendix.

3.3.2 ARDL LONG RUN AND FORM BOUNDS TEST SPECIFICATION

The Autoregressive Distributed Lag (ARDL) approach, was developed in 1999 by Pesaran and Shin, and was extended to the ARDL-bounds test by Pesaran, Shin and Smith in 2001. This procedure is used to test whether a long-run cointegration relationship exists between financial development and economic growth. The ARDL approach model of our variables can be expressed as the following unrestricted error-correction models:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta \mathrm{DEPTH}_{t-i} + \alpha_3 \mathrm{GDP}_{t-1} + \alpha_4 \mathrm{DEPTH}_{t-1} + e_{1t} \quad (1)$$

$$\Delta \mathrm{DEPTH}_t = \alpha_5 + \sum_{i=1}^{n} \alpha_{6i} \Delta \mathrm{DEPTH}_{t-i} + \sum_{i=1}^{n} \alpha_{7i} \Delta GDP_{t-i} + \alpha_8 \mathrm{DEPTH}_{t-1} + \alpha_9 \mathrm{GDP}_{t-1} + e_{2t} \quad (2)$$

The other financial development indicators, namely: CREDIT, LIQUID, STOCK and CAP are specified in a manner similar to the equations above and this system of equations will henceforth be referred to as equations (1) to (10).

As mentioned above, the ARDL bounds approach has numerous advantages when compared to other methods of cointegration testing. The first is its ability to accommodate finite samples of data, eliminating small sample bias. A second advantage is the fact that the ARDL approach accepts variables that are integrated of both order I(0) and order I(1), making it far less restrictive than other cointegration tests. It is important to note that variables integrated of order I(2) are not permitted into the model, as they can invalidate regression results. Another advantage of the model is the fact that it provides unbiased long-run estimates and

valid t-statistics irrespective of the fact that certain regressors may be endogenous within the model.

The ARDL bounds test operates on the basis of a joint F-statistic or Wald test, imposing a null hypothesis of "no cointegration" between variables. In order to test for cointegration, the model provides two bounds of critical values for a given level of significance, an upper and a lower bound. The lower bound's critical value operates on the assumption that all input variables are I(0), indicating no cointegration relationship among the examined variables. The upper bound's critical value operates on the assumption that all the examined variables are cointegrated and are of order I(1). If the calculated F-statistic is lower than the lower bound, the null hypothesis cannot be rejected and no cointegration exists between the variables. If the F-statistic exceeds the upper bound, the null hypothesis is rejected, and variables are deemed to be cointegrated (Louw 2015).

3.3.3 **VECTOR ERROR CORRECTION (VEC) GRANGER CAUSALITY TEST SPECIFICATION**

After identifying the cointegration relationship between variables, using the ARDL approach, a Granger Causality test is applied. The Granger Causality test is employed using Vector Error Correction models. The aim of the test is to examine any Granger causality that exists between financial development and economic growth. The lagged error correction term (ECT) from equations (1) to (10) are included in the Granger causality model in order to examine the presence of long run Granger causality between the financial development indicators and economic growth. The models can be expressed as follows:

$$\Delta GDP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, \Delta GDP_{t-i} + \sum_{i=1}^{n} \beta_{2i}\, \Delta \mathrm{DEPTH}_{t-i} + \beta_3\, \mathrm{GDP}_{t-1} + \beta_4\, \mathrm{DEPTH}_{t-1} + \eta_1 \mathrm{ECT}_{t-1} + e_{1t} \qquad (11)$$

$$\Delta \mathrm{DEPTH}_t = \beta_5 + \sum_{i=1}^{n} \beta_{6i}\, \Delta \mathrm{DEPTH}_{t-i} + \sum_{i=1}^{n} \beta_{7i}\, \Delta GDP_{t-i} + \beta_8\, \mathrm{DEPTH}_{t-1} + \beta_9\, \mathrm{GDP}_{t-1} + \eta_2 \mathrm{ECT}_{t-1} + e_{2t} \qquad (12)$$

The other financial development indicators, namely: CREDIT, LIQUID, STOCK and CAP are specified in a manner similar to the equations above.

The VEC equation is appropriate to use after the existence of a long run cointegration relationship has been found, among the variables. ARDL models fail to provide the direction of causality between examined variables, determining the direction of causality is of critical

importance to this study and this can be determined using the VEC Granger Causality model. The model utilises an F-statistic of the explanatory variables and a T-statistic of the lagged error-correction term in order to distinguish the directional flow of the relationship between variables. The F-statistic is generated by utilising the statistically significant explanatory variables and the error correction term into a Wald test (Louw 2015).

The following section provides an analysis of the results generated after following the statistical procedures described in this section.

CHAPTER 4: EMPIRICAL FINDINGS

4.1 ARDL LONG RUN FORM AND BOUNDS TEST RESULTS

After the variables were tested for stationarity using the Augmented Dickey-Fuller unit root test (the results of which can be found in the appendix) – all variables were found to be integrated of order I(1) and were thus deemed to be appropriate for use in the ARDL model. The Long Run and Form Bounds F-Test results are presented below. The purpose of this test is to determine whether the null hypothesis of no cointegration between the variables, can be rejected. The optimal lag order of each variable specified in equations (1) to (10) was obtained by using the Akaike Information Criterion (AIC) method.

4.1.1 DEPTH

Table 2: Results of the Long Run Form and Bounds Test for DEPTH

Variable Description	F-Statistic	Critical Value Bounds		
		10% Significance Level	5% Significance Level	1% Significance Level
DEPTH (GDP as Dependent Variable)	9.43***	3.14 – 3.67	3.79 – 4.39	5.38 – 6.05
DEPTH (GDP as Independent Variable)	12.05***			

Note: " * ", " ** " and " *** " denote significance at the 10%, 5% and 1% significance levels respectively

The results in the table above provide strong evidence of cointegration between the variables GDP and DEPTH in the ARDL model. The F-statistics associated with the tests when GDP is used as a dependent variable and independent variable are 9.43 and 12.05 respectively, which is significantly higher than the upper bound at the 1% significance level, valued at 6.05. Thus, proving the existence of cointegration between the variables in the model and suggesting the presence of a long-run relationship between these variables.

4.1.2 **CREDIT**

Table 3: Results of the Long Run Form and Bounds Test for CREDIT

Variable Description	F-Statistic	Critical Value Bounds		
		10% Significance Level	5% Significance Level	1% Significance Level
CREDIT (GDP as Dependent Variable)	11.16***	3.14 – 3.67	3.79 – 4.39	5.38 – 6.05
DEPTH (GDP as Independent Variable)	3.1			

The results above showcase strong evidence of cointegration between the variables GDP and CREDIT, when GDP is a dependant variable. The F-statistics associated with the models when GDP is a dependent and independent variable are 11.16 and 3.1 respectively, the former is significantly above the upper bound value of 6.05 at the 1% significance level, providing evidence of cointegration between the variables and suggesting the presence of a long run relationship between them.

4.1.3 **LIQUID**

Table 4: Results of the Long Run Form and Bounds Test for LIQUID

Variable Description	F-Statistic	Critical Value Bounds		
		10% Significance Level	5% Significance Level	1% Significance Level
LIQUID (GDP as Dependent Variable)	3.25*	3.14 – 3.67	3.79 – 4.39	5.38 – 6.05
LIQUID (GDP as Independent Variable)	2.47			

The results of the ARDL long run and bounds test provides evidence of cointegration between the variables LIQUID and GDP, when GDP is a dependant variable. The F-statistics associated with the tests when GDP is a dependent and independent variable are 3.25 and 2.47 respectively. Thus, when GDP used as the dependant variable, the variables are cointegrated and share a long run relationship.

4.1.4 **STOCK**

Table 5: Results of the Long Run Form and Bounds Test for STOCK

Variable Description	F-Statistic	Critical Value Bounds		
		10% Significance Level	5% Significance Level	1% Significance Level
STOCK (GDP as Dependent Variable)	**5.53****	**3.3 – 3.78**	**4.09 – 4.66**	**6.03 – 6.76**
STOCK (GDP as Independent Variable)	**3.19**			

The results presented in the tables above provide evidence of cointegration between the variables GDP and Stock. The F-statistic associated with the model when GDP is a dependent variable is 5.53 and is above the upper bound at the 5% significance level - which is 4.66. This suggests cointegration in the long. When GDP is an independent variable the corresponding F-statistic is 3.19 which falls below the lower bound (3.3-3.78). This suggests that there is no evidence of cointegration between the variables.

4.1.5 **CAP**

Table 6: Results of the Long Run Form and Bounds Test for CAP

Variable Description	F-Statistic	Critical Value Bounds		
		10% Significance Level	5% Significance Level	1% Significance Level
CAP (GDP as Dependent Variable)	2.78	3.3 – 3.78	4.09 – 4.66	6.03 – 6.76
CAP (GDP as Independent Variable)	8.52*			

Results suggest that when GDP is a dependent variable, there is no evidence of cointegration. The associated F-statistic of 2.78 is below the lower bound at the 10% level of 3.3 – providing no evidence of a long run relationship between GDP and CAP. However, when GDP is used as the independent variable, the associated F-statistic of 8.52 is significantly above the upper bound of 6.76, at the 1% level. This suggests a cointegrating relationship between the variables and provides evidence of a long run relationship between them.

4.2 GRANGER CAUSALITY TEST RESULTS

Following the result of the existence of long run cointegration between the variables, gathered from the ARDL long run form and bounds test, a Vector Error Correction Granger Causality test was performed. The results of the short run Granger Causality test are displayed first. Lagged versions of the error correction terms, generated from equations (1) to (10), are then introduced into the model in order to test the long run Granger causality relationship between the variables. The results of the tests are presented in the figures below.

4.2.1 SHORT RUN GRANGER CAUSALITY

Table 7: Results of the Short Run Granger Causality Test with GDP as a Dependent Variable

Independent Variable	F - Statistic	P - Value
DEPTH	2.85***	0.01
CREDIT	4.89**	0.03
LIQUID	3.05**	0.02
STOCK	1.11	0.37
CAP	1.27	0.32

Note: " * ", " ** " and " *** " denote significance at the 10%, 5% and 1% significance levels respectively. Standard errors are represented by ( ).

The results presented in the above table can be represented by the following equations:

GDP = 9.88 + 0.88 DEPTH (13)
(0.55) (0.19)

GDP = 11.17 + 0.62 CREDIT (14)
(0.4) (0.18)

GDP = 11.98 + 0.18 LIQUID (15)
(0.67) (0.24)

GDP = 13.14 + 0.19 STOCK (16)
(0.07) (0.04)

GDP = 12.58 + 0.18 CAP (17)

(0.33) (0.13)

Table 8: Results of the Short Run Granger Causality Test with GDP as an Independent Variable

Dependent Vari1able	F - Statistic	P - Value
DEPTH	**0.94**	**0.52**
CREDIT	**0.67**	**0.76**
LIQUID	**2.36***	**0.06**
STOCK	**0.15**	**0.93**
CAP	**1.37**	**0.29**

The results presented in the above table can be represented by the following equations:

DEPTH = -1.3 + 0.34 GDP (18)

(0.89) (0.07)

CREDIT = -1.44 + 0.29 GDP (19)

(1.06) (0.08)

LIQUID = 2.01 + 0.06 GDP (20)

(0.96) (0.08)

STOCK = -34.1 + 2.57 GDP (21)

(7.02) (0.54)

CAP = -3.03 + 0.43 GDP (22)

(3.96) (0.3)

The results displayed above provide strong evidence of Granger causality between the financial development indicators and economic growth. The variables: DEPTH, CREDIT and LIQUID are all predicted to granger cause economic growth, in the short run. This result concurs with previous studies on the finance growth nexus in Nigeria, which also find the existence of a similar relationship, flowing from financial development to economic growth. The presence of a short run relationship, flowing from GDP to LIQUID is also detected in the results, at the 10% significance level. This is an interesting result because in previous literature, economic growth is not often found to granger cause any of the financial development proxies, in the short run. Thus, evidence of a bidirectional relationship between GDP and LIQUID is provided by the results.

4.2.2 LONG RUN GRANGER CAUSALITY

Table 9: Results of the Long Run Granger Causality Test with GDP as a Dependent Variable

Independent Variable	ECT_{t-1} Statistic	P - Value
DEPTH	**-0.16*** **	**0.00**
CREDIT	**-0.01*** **	**0.01**
LIQUID	**-0.08***	**0.10**
STOCK	**0.01***	**0.09**
CAP	**-0.03**	**0.37**

The lagged error correction term or long run model (from the above table) can be expressed as follows:

$$ECT_{t-1} = 10.16 + 1.0\ DEPTH_{t-1} - 1.04\ GDP_{t-1} \quad (23)$$
$$(0.14)$$

$$ECT_{t-1} = 5.21 + 1.0\ CREDIT_{t-1} - 0.58\ GDP_{t-1} \quad (24)$$
$$(0.07)$$

$$ECT_{t-1} = -1.49 + 1.0\ LIQUID_{t-1} - 0.10\ GDP_{t-1} \quad (25)$$
$$(0.07)$$

$$ECT_{t-1} = 10.48 + 1.0\ STOCK_{t-1} - 0.77\ GDP_{t-1} \quad (26)$$
$$(1.10)$$

$$ECT_{t-1} = -4.63 + 1.0\ CAP_{t-1} + 0.14\ GDP_{t-1} \quad (27)$$
$$(0.15)$$

Table 10: Results of the Long Run Granger Causality Test with GDP as an Independent Variable

Dependent Variable	ECT_{t-1} Statistic	P - Value
DEPTH	**-0.35*** **	**0.01**
CREDIT	**-0.13**	**0.13**
LIQUID	**0.01*** **	**0.00**
STOCK	**0.49*** **	**0.00**
CAP	**-0.14*** **	**0.01**

The lagged error correction term or long run model (from the above table) can be expressed as follows:

$$ECT_{t-1} = -14.59 + 0.59\ DEPTH_{t-1} + 1.0\ GDP_{t-1} \quad (28)$$
$$(0.76)$$

$$ECT_{t-1} = -12.3 - 0.18\ CREDIT_{t-1} + 1.0\ GDP_{t-1} \quad (29)$$
$$(0.81)$$

$$ECT_{t-1} = 91.57 - 37.61\ LIQUID_{t-1} + 1.0\ GDP_{t-1} \quad (30)$$
$$(8.20)$$

$$ECT_{t-1} = -12.68 - 2.22\ STOCK_{t-1} + 1.0\ GDP_{t-1} \quad (31)$$
$$(0.28)$$

$$ECT_{t-1} = -33.46 + 7.33\ CAP_{t-1} + 1.0\ GDP_{t-1} \quad (32)$$
$$(1.83)$$

Results of the long run Granger causality test generally concur with results generated by previous literature on the finance growth nexus, in Nigeria.

Results point to a strong bidirectional relationship between the financial development indicator DEPTH and economic growth (as evidenced by the negative coefficient on the error correction terms), at the 1% significance level. Most of the previous literature including: Arestis and Demetriades (1997), Levine (2003), Nkoro and Uko (2013), Karimo and Ogbonna (2017) and Odeniran and Udeaja (2010) agree that financial depth (as proxied by DEPTH) granger causes economic growth in the long run however, the presence of granger

causality flowing from economic growth to DEPTH is an unusual finding of this study, shared with the findings of Chukwu and Agu (2009).

Results also show that, in the long run, CREDIT granger causes economic growth, at the 1% significance level – in accordance with the findings of Agbetsiafa (2014) and Karimo and Ogbonna (2017). No evidence of a bidirectional relationship between these variables exists, as opposed to the findings of Odeniran and Udeaja (2010).

The presence of a granger relationship between LIQUID and economic growth is also suggested by the results. LIQUID is predicted to granger cause economic growth at the 10% significance level, in the long run. This is in line with the results generated by Chukwu and Agu (2009) and Odeniran and Udeaja (2010), who also predict this relationship. No evidence is provided for a long run, bidirectional relationship between LIQUID and economic growth, as opposed to the prevalence of a short run bidirectional relationship between the variables, found in this study.

There is no evidence of a relationship, flowing in either direction, between STOCK and economic growth, as evidenced by the positive coefficients on the error correction terms. This result is in contradiction to the results generated by Arestis and Demtriades (1997) and Nkoro and Uko (2013), both of which suggest a strong relationship between stock market liquidity and economic growth.

In the case of CAP, there is strong evidence pointing towards a relationship between economic growth and stock market capitalisation. In the long run, results posit that economic growth granger causes CAP, at the 1% significance level, with no relationship flowing in the opposite direction. This result concurs with those generated by Levine (2003), Arestis and Demetriades (1997) and Nkoro and Uko (2013).

Results also suggest that the disequilibrium between the short and long run is rapidly corrected (Louw 2015) - possibly as a result of the efficiency of Nigeria's financial system. Thus, the results above provide strong evidence for the existence of a relationship between financial development and economic growth – in the long run.

CHAPTER 5: CONCLUSION, RECCOMENDATIONS and LIMITATIONS

The aim of this study was to empirically examine the relationship between financial development and economic growth in Nigeria. With the goal of contributing to existing literature regarding this subject and overcoming some limitations faced by previous studies. These limitations included the use of cointegration techniques that were deemed inappropriate for small sample sizes and the use of inefficient proxy variables. In an attempt to mitigate these limitations, this paper examined the finance-growth nexus in Nigeria utilising time-series data and employing statistical methods such as the ARDL long run form and bounds test (to identify cointegration between financial development and economic growth) as well as a VEC Granger Causality Test. The empirical findings show that the financial development proxies: DEPTH, CREDIT, LIQUID and STOCK granger cause economic growth in the Nigerian economy, in the long run. A bidirectional relationship was also discovered between DEPTH and economic growth. The results generated are generally in accordance with existing theory on the subject. GDP was also found to Granger cause CAP in the long run, a surprising result.

To enhance the relationship between financial development and economic growth in Nigeria, it is recommended by this study that economic policies in Nigeria should be geared towards pro-growth polices and focus on promoting financial depth and openness in the country. Successful implementation of these policies should serve to bolster both financial development and economic growth in Nigeria.

One limitation of this study was the lack of stock market data available for Nigeria, this leaves room for further research into the impact that this data may have on economic growth – once enough stock market data have been gathered, in the future.

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APPENDIX

UNIT ROOT TEST RESULTS

The results of the Augmented Dickey-Fuller unit root tests in level and first difference form are presented below. The test was performed using a trend and intercept.

GDP

Table 11: Results of the ADF Unit Root Test for GDP

Variable Description	t - Statistic	Probability	Critical Values		
			10% Significance Level	5% Significance Level	1% Significance Level
GDP at Level Form	-0.18	0.97	-2.6	-2.91	-3.55
GDP at First Differenced Form	-4.36	0			

At the level form, the variable GDP has a t-statistic of -0.18 that is associated with a probability of 0.97. Thus, the null hypothesis that GDP is stationary in level form is rejected. GDP is then differenced and tested for a unit root. At its first difference form, GDP has a t-statistic of -4.36 that is associated with a probability of 0. Thus, we can accept the null hypothesis that GDP is stationary at its first difference form and is an I(1) variable, suitable for inclusion in the ARDL model.

DEPTH

Table 12: Results of the ADF Unit Root Test for DEPTH

Variable Description	t - Statistic	Probability	Critical Values		
			10% Significance Level	5% Significance Level	1% Significance Level
DEPTH at Level Form	-2.66	0.09	-2.6	-2.91	-3.55
DEPTH at First Differenced Form	-6.05	0			

At the level form, the variable DEPTH has a t-statistic of -2.66 that is associated with a probability of 0.09. Thus, the null hypothesis that DEPTH is stationary in level form is rejected. DEPTH is then differenced and tested for a unit root. At its first difference form, DEPTH has a t-statistic of -6.05 that is associated with a probability of 0. Thus, we can accept the null hypothesis that DEPTH is stationary at its first difference form and is an I(1) variable, suitable for inclusion in the ARDL model.

CREDIT

Table 13: Results of the ADF Unit Root Test for CREDIT

Variable Description	t - Statistic	Probability	Critical Values		
			10% Significance Level	5% Significance Level	1% Significance Level
CREDIT at Level Form	-2.33	0.17	-2.6	-2.91	-3.55
CREDIT at First Differenced Form	-6.23	0			

At the level form, the variable CREDIT has a t-statistic of -2.33 that is associated with a probability of 0.17. Thus, the null hypothesis that CREDIT is stationary in level form is rejected. CREDIT is then differenced and tested for a unit root. At its first difference form, CREDIT has a t-statistic of -6.23 that is associated with a probability of 0. Thus, we can accept the null hypothesis that CREDIT is stationary at its first difference form and is an I(1) variable, suitable for inclusion in the ARDL model.

LIQUID

Table 14: Results of the ADF Unit Root Test for LIQUID

Variable Description	t - Statistic	Probability	Critical Values		
			10% Significance Level	5% Significance Level	1% Significance Level
LIQUID at Level Form	-1.8	0.38	-2.6	-2.91	-3.55
LIQUID at First Differenced Form	-5.95	0			

At the level form, the variable LIQUID has a t-statistic of -1.8 that is associated with a probability of 0.38. Thus, the null hypothesis that LIQUID is stationary in level form is rejected. LIQUID is then differenced and tested for a unit root. At its first difference form, LIQUID has a t-statistic of -5.95 that is associated with a probability of 0. Thus, we can accept the null hypothesis that LIQUID is stationary at its first difference form and is an I(1) variable, suitable for inclusion in the ARDL model.

STOCK

Table 15: Results of the ADF Unit Root Test for STOCK

Variable Description	t - Statistic	Probability	Critical Values		
			10% Significance Level	5% Significance Level	1% Significance Level
STOCK at Level Form	-2.44	0.14	-2.6	-2.91	-3.55
STOCK at First Differenced Form	-3.61	0.01			

At the level form, the variable STOCK has a t-statistic of -2.44 that is associated with a probability of 0.14. Thus, the null hypothesis that STOCK is stationary in level form is rejected. STOCK is then differenced and tested for a unit root. At its first difference form, STOCK has a t-statistic of -3.61 that is associated with a probability of 0.01. Thus, we can accept the null hypothesis that STOCK is stationary at its first difference form and is an I(1) variable, suitable for inclusion in the ARDL model.

CAP

Table 16: Results of the ADF Unit Root Test for CAP

Variable Description	t - Statistic	Probability	Critical Values		
			10% Significance Level	5% Significance Level	1% Significance Level
CAP at Level Form	-2.4	0.15	-2.6	-2.91	-3.55
CAP at First Differenced Form	-4.94	0			

At the level form, the variable CAP has a t-statistic of -2.4 that is associated with a probability of 0.15. Thus, the null hypothesis that CAP is stationary in level form is rejected. CAP is then differenced and tested for a unit root. At its first difference form, CAP has a t-statistic of -4.94 that is associated with a probability of 0. Thus, we can accept the null hypothesis that CAP is stationary at its first difference form and is an I(1) variable, suitable for inclusion in the ARDL model.